

## Amendment to the Claims

1. (Currently Amended) A motion estimator of a video encoder, comprising:
  - a search region data memory for storing video data of a previous video frame;
  - a macroblock data memory for storing macroblock data of a current video frame;
  - a first sub sampling circuit for sub-sampling by ratio M:1 the video data of a previous frame read from the search region data memory in response to a sub-sampling rate control signal;
  - a data array circuit for arraying video data outputted from the first sub-sampling circuit so that motion vector estimation candidates can be outputted sequentially to a second sub-sampling circuit for sub-sampling, by ratio M:1, current video frame data read from the macroblock data memory in response to the sub-sampling rate control signal;
  - a macroblock measure circuit for receiving the current frame video data read from the macroblock data memory to calculate a sum of absolute differences (SAD) between a mean intensity of a macroblock and an intensity of each pixel of the macroblock;
  - a search region deciding circuit for outputting a search region decision signal based on the sum of absolute differences between the mean intensity of the macroblock and the intensity of the each pixel of the macroblock;
  - a processing element (PE) array network for sequentially calculating a SAD (~~sum of absolute differences~~) value of the data outputted from the first sub-sampling circuit and the search region data outputted from the data array circuit, according to the search region decision signal ~~a designation of the search region decided by the search region deciding circuit~~, to sequentially output a plurality of SAD values;
  - a motion vector comparator for receiving the plurality of SAD (~~sum of the absolute differences~~) values sequentially outputted from the PE array network, and comparing ~~the each~~ SAD value with a previous SAD value, to detect a minimum SAD value as a motion vector value.
2. (Cancelled)
3. (Currently Amended) The motion estimator as claimed in 21, further comprising a comparator for selecting an intermode or an intramode based upon a comparison of the sum (A)

of the absolute differences between the mean intensity of the macroblock and the intensity of each pixel of the macroblock, with a predetermined threshold value.

4. (Currently Amended) The estimator as claimed in 21, further comprising:

a controller for generating a sub-sampling rate control signal per each of upper, medium and lower steps to obtain a motion estimation, and an address to read and write the macroblock data and the search region data, and for receiving a motion vector value detected per each of the upper, medium and lower steps to output a motion estimation candidate designation signal; wherein the sub-sampling rate control signal of the upper step is a signal causing a 4:1 sub-sampling ratio.

5. (Currently Amended) The estimator as claimed in 21, further comprising:

a controller for generating a sub-sampling rate control signal per each of upper, medium and lower steps to obtain a motion estimation, and an address to read and write the macroblock data and the search region data, and for receiving a motion vector value detected per each of the upper, medium and lower steps to output a motion estimation candidate designation signal; wherein the sub-sampling rate control signal of the medium step is a signal for causing a 2:1 sub-sampling ratio.

6. (Currently Amended) The estimator as claimed in 21, wherein the macroblock measure circuit comprises:

an  $AVG_{MB}$  average calculating circuit for receiving the current frame macroblock data of the current frame and calculating the mean intensity value of the macroblock; and

a sum (A) calculating circuit for receiving the ~~current frame~~ macroblock data of the current frame and calculating the sum (A) of the absolute differences between the mean intensity of the macroblock and the intensity of each pixel of the macroblock.

7. (Original) The estimator as claimed in 1, wherein a  $\pm 4$  pixel search region for a 4x4 pixel block is operatively divided into four  $\pm 2$  pixel search regions, and the PE array network sequentially searches the four  $\pm 2$  pixel search regions to sequentially output the SAD values for the 4x4 pixel block within the  $\pm 4$  pixel search region.

8. (Currently Amended) The estimator as claimed in 1, wherein for performing a search for a 8x8 pixel block within a  $\pm 2$  pixel search region, the 8x8 pixel block is operatively divided into four 4x4 pixel sub-blocks, and the PE array network sequentially searches for each of the 4x4 sub-blocks within the  $\pm 2$  pixel search region and sequentially outputs four SAD values for each one of the 25-search points within the  $\pm 2$  pixel search region.

9. (Original) The estimator as claimed in 1, wherein for performing a search for a 16x16 pixel macroblock within a search region, the 16x16 pixel macroblock is operatively divided into sixteen 4x4 pixel sub-blocks, and the PE array network sequentially searches for each of the 4x4 sub-blocks within the search region and sequentially outputs sixteen SAD values for each one of the search points within the search region.

10-20 (Cancelled).